# Chapter 5

## Wastewater
## Design Standards and Policies
## Revised December 1999

**Chapter 5, Sewer System Design**, provides guidance and minimum design criteria for the modification and construction of the water systems owned and operated by the City of Scottsdale.

# Section 5.1

## SEWER SYSTEM DESIGN
### DESIGN STANDARDS AND POLICIES
### REVISED DECEMBER 1999

### CHAPTER 5
### WASTEWATER

# SECTION 5.1
# SEWER SYSTEM DESIGN

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# SEWER SYSTEM DESIGN

**SECTION 5-100 GENERAL COMMENTS**

This document provides guidance and minimum design criteria for the modification and construction of the wastewater collection and treatment systems owned and operated by the City of Scottsdale. It is intended for use in the planning, design and planning preparation processes.

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY REQUIREMENTS.
Engineering Bulletin #10, “Guidelines for the Construction of Water Systems”, and, Engineering Bulletin #11 “Minimum Requirements for Design, Submission of Plans, and Specifications of Sewerage Works” published by the Arizona Department of Environmental Quality, contain specific requirements for submittals, approvals, and notifications. It shall be the responsibility of the developer to comply with these regulations and requirements.

a. Prior to submitting Final Plans for City Approval, the developer shall provide "Certificate of Approval to Construct Water and/or Wastewater Systems”. This approval is provided by the Maricopa County Environmental Services Department and shall appear on the cover sheet of the improvement plans.

b. Prior to performing inspections, the developer shall submit evidence that “Notification of Starting Construction” has been submitted to the Maricopa County Environmental Services Department. This evidence will be on a document developed and date stamped by the County.

c. Prior to issuing a Letter of Acceptance, the developer will provide the Maricopa County Environmental Services Department the following documents:

- The Engineers Certificate of Completion with all test results, analysis results, and calculations as indicated on the form.
- A "Request for Certificate of Approval of Construction" of Water/sewer Lines with all appropriate quantities and As-Built for the facility when field changes have occurred which modify the approved plans.

d. The developer shall then provide the City's Inspection Services Division with a "Certificate of Approval of Construction" signed by the Maricopa County Environmental Services Department and a copy of the As-Built drawings.

## A. ORDINANCE REQUIREMENTS

The City requires sewer lines to be installed along the entire length of property frontage(s) of the property to be developed whenever future extension of the line is possible. The property line frontage is that portion of the property along a public right-of-way. If a parcel to be developed has more than one property line frontage, the City will require a sewer line to be installed along all frontages.

1.) When a public sewer is located within six hundred sixty (660) feet of the boundary of the subject project, the sewer shall be extended to sewer the project. A private sewage disposal system may be constructed only when a public sewer system is not available. Private sewage disposal system must comply with all laws and regulations of the State of Arizona, Maricopa County, and the City of Scottsdale. Sewer lines shall not be privately owned if future connections to said sewer lines will be necessary to serve adjacent parcels.

The City may participate in the cost of oversizing sewer line extensions when said extension is intended to serve properties other than the user's property.

Upon development of property for which City sewer service is desired and available, the developer shall submit a plan for the sewer system prepared by a professional engineer licensed in the State of Arizona.

The developer shall install, at his/her expense, all on-site and off-site improvements necessary to serve his/her development. This includes payment of all required development fees.

The City may require users who have a non-residential discharge to monitor their discharges and obtain an Industrial Waste Discharge Permit.

For more specific information on ordinance requirements, review of Chapter 48 (Subdivisions) and Chapter 49 (Water, Sewer and Sewage Disposal) of the Scottsdale Revised Code is recommended.

## B. CITY POLICIES

Sanitary sewers shall be designed to serve the ultimate population density expected in the tributary area. The design must be in conformance with the current City-approved Wastewater Master Plan and Wastewater Facilities Management System - User's Manual and, shall take future connections into consideration.

Sewer lines shall not be privately owned if future connections to said sewer lines will be necessary to serve adjacent parcels.

Private sewer lines shall meet Maricopa County Health Department and City of Scottsdale Building Inspection requirement for approval. Privately owner and maintained sewer lines shall not be located in the street right-of-way (R.O.W.) or a Public Utility Easement (PUE).

On-site sewer collection systems within commercial shopping centers and multi-family projects with private streets shall be designed as private systems. Developers of privately owned and operated sewer lift stations shall provide to the Water Production Department, the name and certification of an appropriately certified operator by the Arizona Department of Environmental Quality.
Design of small diameter, low pressure, or alternative sewer systems may be allowed by the Water Resources Department upon the engineer's demonstration that conventional or lift stations cannot provide adequate service to the development.

### C. REIMBURSEMENT AGREEMENTS

Reimbursement agreements are provided for developers and property owners who extend the City's water and/or sewer systems to developing areas within the city's service area. These agreements provide a mechanism for reimbursing the developer for partial costs of the lines by those who subsequently tie to the line and therefore benefit by the line extension.

The elements of the extension policy and program are set forth in Article V of Chapter 49 (Water, Sewer, Sewage Disposal) of the Scottsdale Revised Code and shall apply to all extensions of the city water and sewer system.

### D. PRIVATE SEWER COMPANIES

Portions of Scottsdale's municipal service area are provided sewage disposal service by private sewer companies. Figure 5.1-1 in the Appendix delineates these areas.

Modifications or construction of sewage collection and disposal systems within private sewer company franchise areas should be reviewed and signed by the subject company prior to City of Scottsdale approval. The City of Scottsdale will review private sewer systems within the City limits upon request and payment of applicable fees. A note must be placed on the drawings delineating operation and maintenance responsibilities.

### E. EPA REGULATIONS

The City is required by the USEPA to develop and implement a program to control discharges that might harm the Publicly Owned Treatment Works (POTW). The program establishes local discharge limits for non-residential users and provides for a permitting process based on the users discharges and type of business. Details of the program and requirements are found in Article IV of Chapter 49 (Water, Sewer, Sewage Disposal) of the Scottsdale Revised Code. Specific information may be obtained by calling the Water Resources Department at 480-312-5685.

## 5-102 SEWER COLLECTION SYSTEMS

### A. PIPELINES

In selecting pipe material for sewers, consideration should be given to all chemical characteristics of the wastewater, especially in industrial waste flow areas. The possibility of septicity, exclusion of infiltration, external and internal pressures, abrasion and similar problems encountered with the established grades.

Sanitary sewer lines shall be vitrified clay pipe (VCP), SDR35 polyvinyl chloride (PVC), up to fifteen (15) inches, ASTM F679 - T1 for PVC eighteen to twenty-seven (18-27) inches or

ductile iron pipe (DIP) with an approved interior and exterior liners. Those systems designed with velocities of 2.5 feet per second shall be constructed of either Vitrified Clay or Ductile Iron pipe. Alternate material will be considered by the City upon submittal of written request by the engineer.

In general, pipe materials should not change between manholes.

Where standard strength pipe is not structurally sufficient or when proper cover cannot be maintained, additional strength must be obtained by using extra-strength pipe, special bedding specifications or special construction methods.

All types of pipe material used in design shall have established ASTM, ANSI, or NSF standards of manufacture or seals of approval and shall be designated for use as sewer pipe.

No public sewers shall be less than eight (8) inches in diameter unless permission is received in writing from the Water Resources Department.

## B. SYSTEM LAYOUT

If the horizontal direction or slope of the sewer line changes, a manhole shall be constructed. The horizontal angle formed between the two lines shall not be less than ninety (90) degrees. In sewers that are twelve (12) inches or larger, angles formed shall be between one hundred-twenty (120) and one hundred-fifty (150) degrees to the downstream pipe, for odor control purposes.

Horizontal curvilinear sewers will not be allowed.

Sewer flows shall not pass through collection systems that have not been accepted by the City of Scottsdale.

Public sewer flows shall not flow through a private sewer system.

All public sewer lines shall be located within a dedicated street right-of-way or private street access easement. All sewers shall be aligned parallel to and south or west of the street centerline. In general, sewer lines should not cross the street centerline except in cases where curvilinear roadway alignments are encountered.

## C. DESIGN FLOWS

In the absence of flow data provided by the designer, new domestic sewage systems shall be designed in accordance with the following:

1. Sewers eight (8) to twelve (12) inches in diameter shall be designed with peak capacities, when flowing full, of not less than four hundred (400) gallons per capita per day (gpcd).

2. Sewer lines larger than twelve (12) inches in diameter shall be designed using one hundred five (105) gpcd and a peaking factor developed from “Harmon’s Formula”:

   $Qmax=Qavg[1+14/(4+P^{1/2})]$
   WHERE: P = Population / 1,000

   Commercial flows should be based upon known regional data or accepted engineering reference sources, approved by the City.

Density data to be used in sewer design*:

| | |
|---|---|
| Single-family units | 2.5 persons/unit |
| Multi-family units: | |
| Townhouse/Patio homes | 2.5 persons/unit |
| Apartments | 2.5 persons/unit |

*Subject to regional variations as approved by the City's Planning Department.

## D. HYDRAULIC DESIGN

Sewer lines should be designed and constructed to give mean velocities of not less than 2.5 fps, based upon Manning's Formula, using an "*n*" value of 0.013. Hydrogen sulfide problems continue to be a concern, therefore must be analyzed in the Design Report and be provided for the design of the system where required. Conversely, to prevent abrasion and erosion of the pipe material, the maximum velocity shall be limited to 10 fps at estimated peak flow. Where velocities exceed this maximum figure, the line shall be constructed of DIP or its equivalent. In no case shall the velocities greater than 15 fps be allowed. All velocities should be analyzed under peak flow conditions.

The d/D ratio for gravity sewer pipes 12 inches in diameter and less shall be no greater than 0.65 in the ultimate peak flow condition. The d/D ratio for gravity sewers greater than 12 inches in diameter shall be no greater than 0.70 in the ultimate peak flow condition.

## E. MANHOLES AND CLEAN OUTS

Manholes in City streets must be located near the center of the traffic lane of the interior lane, rather than on or near the line separating traffic lanes. Manholes should not be located in bike trails, equestrian trails, sidewalks, or crosswalks. Manholes shall be installed at the end of each line, at all changes of grade, pipe sizes, alignments and at distances not to exceed those shown below:

| SPACING: | Maximum Manhole |
|---|---|
| Pipe Size - Inches | Spacing - Feet |
| 8 - 15 | 500 |
| 18 - 30 | 600 |
| 36 - 60 | 800 |
| Over 60 | 1,300 |

Cleanouts may be used in place of manholes at the end of laterals which cannot be extended and are less than one hundred fifty (150) feet in length. Cleanouts must be placed on the end of all line extensions to allow for cleaning and televising of lines. To assure line, grade and material compatibility, a manhole shall be installed at the point of connection when a cleanout is removed for a sewerline extension.

All manholes should be the pre-cast concrete type as detailed in the Maricopa Association of Governments (MAG) standard details for Public Works Construction, detail No. 420, excluding the steps and/or cast in anchors for steps. If a manhole is more than ten (10) feet deep or the line is over twelve (12) inches in diameter, the manhole shall be five (5) feet in diameter.

A water stop gasket shall be installed on all manholes except when Vitrified Clay pipe is used.

The flow channel through the manhole shall be steel-trowel finished to conform in shape and slope to that of the sewers. The manhole shelf shall be brush or broom finished, with a slope of one inch per foot. The manhole bottom should be filleted to prevent solids depositions and channeled to ensure satisfactory flow to the lower invert.

Manholes shall be protected from storm drainage and flooding conditions. Sewers will not be allowed in washes or drainage areas unless otherwise approved in writing by the City's Water Resources Department. When designs specify manholes to be located in washes or drainage areas, bolted watertight covers shall be used to prevent inflow. The rim elevation of these manholes shall be a minimum of eighteen (18) inches above grade. If a manhole is located in a wash, it shall be watertight and the engineer shall provide appropriate protection under Q-100 conditions. This may require encasement of the entire manhole using sono-tube, form material, or the construction of a monolithic manhole. The manhole shall be designed by the engineer to meet the amount of protection as dictated by the flow conditions of the wash. Providing for the elimination of infiltration and/or exfiltration in washes is the Engineer's responsibility in the design of the system.

1. Intersecting Lines Within Manholes

   Manholes shall be required for all lines intersecting at angles other than $180^{o}$ and/or a change in slope. The manhole shall have a minimum 0.10 foot drop across the manhole unless otherwise approved by the Water Resources Department. When sewer lines of different sizes enter the same manhole, the upstream pipe shall not have its crown lower than the crown of the downstream pipe. In large trunk lines, inverts at junctions should be designed to maintain the energy gradient across the junction and prevent backflow.

2. Drop Manholes

   If the difference in invert elevations between inflow and outflow sewers exceed one pipe diameter, a drop connection shall be installed in accordance with MAG standards detail No. 426. The manhole bottom shall be filleted to prevent solid deposition.

3. Monitoring Vaults

   The City shall determine whether or not a sewer user will be required to have a monitoring manhole to test the flow and composition of their sewage. As a general rule, sewer users with a projected water consumption of 25,000 gallons per day or a discharge of a categorical industrial nature or as otherwise required by the City's Water Quality Division of the Water Resources Department, shall be required to have a monitoring manhole.

4. Monitoring Manholes

   On sewer service lines that require monitoring manholes shall be the standard MAG detail 420 modified manhole with a straight channel and no taps or bends for two (2) pipe lengths downstream.

   Design details for monitoring manholes on sewer lines six (6) inches or larger with a peak flow greater than forty (40) gpm shall be approved by the City.

   Monitoring manholes shall be located in a twelve (12) foot PUE which extends from the manhole to the existing public sewer. The monitoring manhole shall be accessible at all times for monitoring crews and vehicles.

## F. **PIPE LOCATIONS AND SEPARATIONS**

When street location is not possible, public sewer lines shall be located within a twenty (20) foot easement within a dedicated tract that maintains unrestricted vehicular access at all times. Sewer lines shall be located a minimum of six (6) feet from a property or easement line. Sewers will not be allowed in easements between houses / private properties that do not meet the above criteria unless otherwise approved.

1. Depth of Sanitary Sewers

   Sewer shall be installed at a depth sufficient to ensure gravity drainage of wastes from each service. Sewer design shall ensure gravity drainage from the ultimate drainage area, and shall allow for future extensions of service to adjacent parcels. In no case shall sewer lines be installed with less than four (4) feet of cover over the top of the pipe unless otherwise approved. If sewer lines are located in washes and / or drainage areas, the pipe must be placed four (4) feet below scour depth and shall be constructed of DIP.

   All sewers shall be designed to absorb superimposed live loads and backfill overburden without damage to the pipe material and without adversely affecting the hydraulic characteristics of the pipe. The Engineer shall specify minimum depths of cover to be provided during the construction of roadways or other facilities affecting cover over the sewer line.

2. Separation of Water and Sewer Lines

   Caution should be taken in the design and construction of the sewer lines to protect all water supplies from wastewater contamination. To minimize the potential of contamination, the engineer shall design the horizontal and vertical separation of water and sewer lines in accordance with Arizona Department of Health Services Bulletin 11.

   Where conditions prevent adequate horizontal and vertical separation, both the water and sewer lines shall be constructed of ductile iron pipe (class 150 minimum) with mechanical restraining joints

3. Separation from Other Utilities

   The minimum horizontal distance from a sewer line to any other line shall be six (6) feet wall-to-wall unless otherwise approved. Please see detail 2372 in the City of Scottsdale Supplemental Standard Details.

4. Separation from Storm Drains and Culverts

   Sewer lines crossing less than two (2) feet below a storm drain or culvert, or under large structures such as box culverts and bridges will require additional protection such as the use of ductile iron pipe or encasement. Sewers crossing over storm drains and culverts must be a minimum of one (1) foot above and be adequately protected.

5. Sewer Connections

   Developers shall utilize all sewer lines to property. Those lines not used shall be abandoned by the developer by disconnecting the line at the main.

## G. **HOUSE AND BUILDING CONNECTIONS**

1. Sizes
   Sewer taps shall be the following minimum sizes:

   | | |
   |---|---|
   | Residential : | 4” |
   | Multi-family : | 6” |
   | Commercial : | 6” |

2. Installation
   All service line connections shall be installed perpendicular to the lateral in accordance with MAG Standards. Taps installed for future connection shall be marked.

3. Location
   All proposed sewer service lines shall be shown on the plans with stations and dimensions. Typical separation dimensions from the water service lines shall be shown. Each lot unit must be provided with its own individual sewer service unless otherwise approved in writing by the City. The location should be coordinated so as to avoid conflicts of other utilities, with driveway locations and should be located within the downstream 1/3 of the fronting sewer line length.

   Because water lines are located behind the curb in many locations, conflicts with sewer service lines are possible. Sewer lines should be designed to allow sewer service lines to pass under water mains behind the curb with twelve (12) inches of clearance to minimize potential health hazards.

   When it is not possible to maintain sufficient clearance or the sewer service will pass over the water main, the sewer service must be encased in concrete of six (6) inches minimum thickness, six (6) feet from each side of the crossing, or ductile iron pipe must be used for the same distance. See MAG detail 404.

4. Requirements for Sewer Service Lines on Large Sewer Lines
   Sewer lines fifteen (15) inches or larger may be tapped only with a manhole. Sewer service lines into manholes may be angled, but the flow line of the sewer service line shall not be more than four (4) inches below the crown of the line to be tapped.

5. Taps into Manholes
   No more than four (4) sewer service lines may be made into any individual manhole without written approval from the City. Sewer service line inverts shall be a maximum of one service line pipe diameter above the crown of the outflow pipe.

6. Grease and Oil Traps
   Grease, oil and sand interceptors which are acceptable to the City shall be provided for laundries, restaurants, automobile service facilities and other facilities when in the opinion of the City, they are necessary for the proper handling of liquid wastes. Interceptors shall be supplied and maintained by the owner. For more details, please contact the Wastewater Division of the Water Resources Department at 480-312-5685.

## H. **EASEMENTS WITHIN TRACTS REQUIREMENTS**

Easements within tracts for sewer lines shall not be less than twenty (20) feet in width and shall run parallel to the property line. The tract shall extend to the dedicated street right-of-way.

Sewer line tracts must be free of obstruction and accessible to City service equipment. Areas in question must be reviewed by the City's Water Operations Department.

Sewer line easements located within tracts shall have a ten (10) foot wide hardened path with a cross-sectional slope not greater than 10%. The hardened path shall consist of native soil with 95% compaction and compacted for a depth of one (1) foot from the surface.

Abandonment of water and/or sewer easements will adhere to the following criteria.

1. A letter requesting the abandonment of the easement and reason for the abandonment shall be submitted to the Water Resources Department with the following exhibits:
   a) Detailed map depicting the easement to be abandoned shall be highlighted and the locations of both water and sewer lines shall be shown in reference to the easement in question.
   b) If water and/or sewer lines are to be abandoned, a detailed civil plan prepared by a professional engineer licensed in the State of Arizona must be supplied describing the method of abandonment.
   2. A letter will be issued stating approval or denial of the abandonment request, certain stipulations may be required in conjunction with the abandonment, and will be stated in the letter from Water Resources Department.
   3. The individual will be responsible for submitting original packet with Water Resources Department decision to the Project Review Department for final approval.

Failure to supply the above noted criteria and exhibits will result in denial of the request.

## 5-103 SEWAGE PUMP STATIONS

Any improvements that require deeded properties shall not be accepted for service until clearance from the City of Scottsdale's Asset Management Department has been issued.

A development that will not provide service to adjacent properties that provide service to less than 30 connections shall be considered private and shall be maintained by the Home Owners Association and/or Property Owners Association. The sewer system in this development must also be a private sewer system.

## A. **SITE SELECTION**

In selecting a site for a sewage pumping facility, consideration should be given to:

- Accessibility
- Drainage Characteristics
- Visual Impact
- Function and Design Constraints

The potential for flooding should be considered when selecting a pump station location. The station's equipment shall be protected from damage and remain operable during a 100-year flood.

Prior to the construction of any site to be dedicated to the City, the developer shall deliver the deed to said property to the Water Production Manager of the Water Resources Department. This deed shall be free of any lien or encumbrances and shall be accompanied by a title report.

## B. PUMP STATION DESIGN

Sewage pump station requirements are provided by the State of Arizona Department of Health Services and are published in their Engineering Bulletin No. 11. Additional requirements specific to the City of Scottsdale must be obtained from the Water Production Division of the Water Resources Department before beginning design. At a minimum, telemetry, dual pumps, backup power supply, three phase power and odor control will be required. The site shall be large enough to contain all the equipment and service equipment for repairs.

Prior to the preparation of construction drawings, a preliminary or basis of design report will be prepared and submitted to the City of Scottsdale for acceptance. The preliminary report should outline the type of equipment and controls proposed for the station. A final design report prepared by a registered professional engineer licensed in the State of Arizona must accompany all pump station design drawings.

## C. FORCE MAINS

1. Velocity Requirements
   The velocity of flow in the force main shall be between 4 and 6 fps.

2. Materials of Construction
   All types of pipe material used in design of the force mains shall have established ASTM, ANSI, AWWA and NSF standards of manufacture or seals of approval and shall be designated as pressure sewer pipe. Force mains shall be identified as such with marking tape one foot above the pipe.

3. Air Release Valves
   Air release valves designed for sewage shall be provided on force mains at all peaks in elevation. (See figure 5.1-6 in the Appendix of this manual.)

4. Cleanouts
   Two-way cleanouts shall be provided every one thousand three hundred (1,300) feet apart or one-way cleanouts every six hundred fifty (650) feet. See figure 5.1-4 in the Appendix of this manual for a detail of force main cleanouts.

5. Force mains shall be constructed of restrained D.I.P. for the following conditions:
   a) At all locations where a vertical realignment is required.
   b) Crossing of drainage areas.
   c) Air Release Assemblies.
   d) Clean-out Assemblies.

6. Water Line Separation

Where a force main crosses a water main or transmission line, protection shall be provided as per ADEQ Bulletin 10 and 11. At a minimum, the force main shall be constructed of ductile iron pipe for a distance of ten (10) feet on each side of the water line.

For details regarding force main discharge into a manhole, refer to Figure 5.1-2 in the Appendix of this manual.

The minimum separation between the force mains and water lines shall be two (2) feet wall-to-wall vertically and six (6) feet horizontally under all conditions. Where a sewer force main crosses above, or less than six (6) feet below a water line, the sewer shall be encased in at least six (6) inches of concrete for ten (10) feet on either side of the water line.

7. Testing
   Prior to issuance of a Certificate to Operate, all force mains shall be pressure tested.

   Preparatory to testing, the section of the pipeline to be tested shall be filled with water and placed under slight pressure for at least forty-eight (48) hours. The pipeline shall then be brought up to one hundred fifty (150) psi over or to one hundred twenty-five (125) percent of system operating pressure, whichever is greater, and shall be maintained on the section under test for a period of not less than four (4) hours, with no leakage.

## 5-104 SEWAGE TREATMENT

### A. TREATMENT PLANTS

The subject of wastewater treatment plant design is beyond the scope of this design booklet. The engineer is urged to contact Maricopa County Health Department and the City of Scottsdale Water Resources Department for further information pertaining to the development of wastewater treatment facilities within Scottsdale.

### B. SEPTIC SYSTEMS

When sewer service is not available, a septic system may be allowed with the approval of both the City of Scottsdale and the Maricopa County Health Department.

For planned developments, a “dry” sewer line shall be installed along the entire length of the property line frontage. The property line frontage is that portion of the property along a public easement. If a parcel to be developed has more than one property frontage, the City will require a sewer line to be installed along all frontages. Sewer taps on a dry system shall be described as such by marking the end of the tap with a permanent marking.

The operation and maintenance of septic systems are the responsibility of the owner. The City of Scottsdale will not accept any septic system for operation and maintenance.

### C. WASTEWATER RECLAMATION AND ADVANCED TREATMENT

The City’s current Sewer Master Plan calls for the development of regional wastewater reclamation facilities. Reclaimed water is to be used to satisfy the demand for water to irrigate golf courses and parks. Reclaimed water in excess of the irrigation demand shall be

provided advanced treatment and stored under ground for subsequent recovery. Contact the City's Water Resources Department for more detailed information on this plan.

## 5-105 PLAN PREPARATION

### A. GENERAL NOTES

Notes which apply to construction on the City of Scottsdale's sewer system are required on each set of improvement plans which include work on the City's sewer system or a sewer system which is to be dedicated to the City. These notes are provided in Chapter 1, Figure 1.13.

### B. PLAN REQUIREMENTS

The following paragraphs highlight improvement plan requirements pertaining to the preparation of sewer improvement plans which are to be submitted to the City for approval.

1. Sewer line stationing shall be along the centerline of the pipe.

2. Concrete encasement shall be shown in both plan and profile. The beginning and ending stations of the encasement shall be called out.

3. If a line is to be connected to an existing system, the following note shall be placed on the plans: "Contractor shall verify the location of the existing sewer line before proceeding with trenching."

4. All sewer improvements shall be shown in both plan and profile. Plan and profile sheets shall be standard 2' x 3' size with a scale of either 1" = 20' or 1" = 40' horizontally and 1" = 2' or 1" = 4' vertically unless otherwise approved by the City.

5. Both slopes and elevation shall be shown on all proposed sewer main stubs.

6. Where sewer lines cross water lines, storm drains or drainage culverts, the relationship shall be shown in both plan and profile and a minimum separation~~s~~ shall be called out.

7. For permitting purposes, quantities for all items of work within the public right-of-way and public utility easements shall be included on the cover sheet of the plans.

8. Sewer service line invert elevations shall be called out for all plans showing sewer service line connection.

9. The drawings shall show all utility locations, sizes, easements, right-of-way and other structural features of the sewer.

10. Lift station details shall show all invert elevations, structural elevations, existing and finished grades, control setting elevations, structural design of wet well~~s~~ and dry well~~s~~, valves and piping, surge control devices, pump suction and discharge details and any other details which will provide a clear understanding of the design.

11. Plans and profiles of force mains shall show size, invert and grade elevations, materials of construction, utility locations and any other details which define the force main construction requirements.

12. Private and dry sewer lines shall be noted as such on plans. The responsibility for operation and maintenance should also be called out.

13. Easements within tracts shall be noted and shown in plan view including docket and page numbers or recorder's number.

14. All plan documents for sewers and/or wastewater treatment work shall be prepared by a registered professional engineer licensed in the State of Arizona under the provisions of ARS 32:141-145.

15. Must have specific Design Review or Preliminary Plat stipulations.

There are additional requirements for the preparation of improvement plans in the City of Scottsdale. The additional requirements are presented in Section 1.1 of the City of Scottsdale Design Standards and Policies Manual.

## C. DESIGN REPORTS

A design report may be required depending on the complexity of the work. The design report serves to present necessary information concerning design assumptions and computations.

The objective of the report is to provide background information for review of the project. All proposed lift station designs shall be accompanied by a signed and sealed design report.

## D. RECORD DRAWINGS

Record drawings are required for all sewer system improvements. Upon approval of the improvement plans, the developer shall provide the City of Scottsdale with one set of full size photo mylars (4 ml) of the approved set of plans prior to occupancy certificate and letter of acceptance.

## E. REVIEWS AND APPROVALS

All improvement plans which include work on the City of Scottsdale's sewer system or on a system which is to be dedicated to the City must be submitted for review and approval by City staff. Plan review submittals are made to the Community Development Department at the "One Stop Shop", 7447 E. Indian School Road, Suite 125, Scottsdale, Arizona 85251, 480-312-2500. Plan review fees must be paid at the time of plan submittal.

Maricopa County Health Department approval is required prior to City approval. No permits for public sewer installation will be issued until the owner / developer has provided the necessary easements and rights-of-way. The instruments of dedication must be approved by the City of Scottsdale and recorded at the Maricopa County Recorder's Office.

## F. **MASTER PLANS**

A copy of the accepted, signed Master Plan shall be submitted when final civil plans are submitted.

A Wastewater Master Plan and report shall be prepared in accordance with the City's Design Standards and Policies Manual by a registered professional engineer who is licensed to practice in the State of Arizona. The master plan and report shall address, but not limited to:

1. The Master Plan will become the basis for a Water and Wastewater Service Agreement between the developer and the City of Scottsdale when such agreement is required by the City. This agreement will specify terms and requirements for water and wastewater service to the development. The introduction to the report should state this.
2. All development projects shall be responsible for determining their specific wastewater system needs. Service for proposed developments shall not be provided at the expense of existing customers and the wastewater master plan shall verify this.
3. Adequate sewer capacity must be shown for the development. In addition, sewer system calculations or a sewer model shall be used to determine the required on-site and off-site facilities such as sewer lines, lift stations and force mains necessary to serve the project.

    a. If no change in zoning is proposed, then the wastewater system for the project must be analyzed to he point of discharge to an existing sewer which has sufficient capacity to serve the project and which is included in the current City Wastewater Master Plan.

    b. If the proposed development requires a change in zoning which increases density or proposes a sewer different from the City's existing Wastewater Master Plan, then additional off-site calculations may be required as directed by the City's Water Resources Department.

    c. Calculations should be based on Manning's equations using a Manning's "*n*" of 0.013 and the invert elevation and pipe diameters of all existing and proposed pipes.

    d. Wastewater flows generated within the development shall be calculated as specified in section 5.102C - Design Flows.

    e. Off-site calculations shall be based on a sewer sub-basin which shall be shown on an accompanying map. The sub-basin shall include all areas upstream and downstream of the development to the next interceptor sewer. An interceptor sewer shall be defined as 15-inch diameter or larger.

    f. Off-site wastewater flows shall be as specified in the City's current Wastewater Master Plan.

    g. A computer disk containing all calculations shall be submitted along with the master plan report. Common spreadsheet formats compatible with Microsoft Excel are acceptable.

4. Compliance with the current City's Wastewater and Wastewater Facilities Management System Master Plans.
5. Each Master Plan must include a map showing the following:

    - All proposed on-site and off-site facilities; including, but not limited to,

    - interceptors
    - sewer lift stations
    - force mains
  - Proposed street locations
  - Parcel boundaries
  - Proposed lots within each parcel
  - Contour lines at two (2) foot intervals showing the elevation of the land surface. If drainage requirements will require extensive grading, then finished grade should be shown. Sufficient information must be provided to evaluate pipe cover.
  - A separate area location map shall be provided showing existing and proposed streets, as well as existing parcels surrounding the project to a distance of not less than one (1) mile from the exterior boundaries of the project. Assessor's maps can provide the information required to prepare these composite maps.
  - The scale of all maps must be sufficient to show all required information clearly.

6. All sewer lines which cross golf course areas must do so within established roads. If dedicated roads are not practical, then crossing must be made within twenty (20) foot wide paved easements. All other sewer lines outside dedicated rights-of-way must be on easements not less than twenty (20) feet wide. No walls shall cross these easements.

7. Easements within tracts for sewer lines shall not be less than twenty (20) feet in width and shall run parallel to the property line. The tract shall extend to the dedicated street right-of-way with a manhole. Sewer line tracts must be free of obstruction and accessible to City service equipment. Areas in question must be reviewed by the City. Sewer line easements located within tracts shall have a ten (10) foot wide hardened path with a cross-sectional slope not greater than 10%.

8. The Wastewater Master Plans must show compliance with Section 49-199 of the Scottsdale Revised Code to construct pipelines, if not already in place, across all dedicated frontages of the development. If the slope of the existing ground is such that other properties fronting the sewer would not benefit, then this condition must be justified in the report.

9. A construction schedule shall be included in a table format for all wastewater related construction required to serve the development. The schedule shall have each phase or parcel as column headings and each construction project or system component as row headings. A mark in each box shall specify when each constructed item will be required for each phase of the development.

More specific information regarding master wastewater plan requirements and the City's current Wastewater and Wastewater Facilities Management System Master Plan can be obtained by contacting the City of Scottsdale Water Resources Department at 480-312-5685.

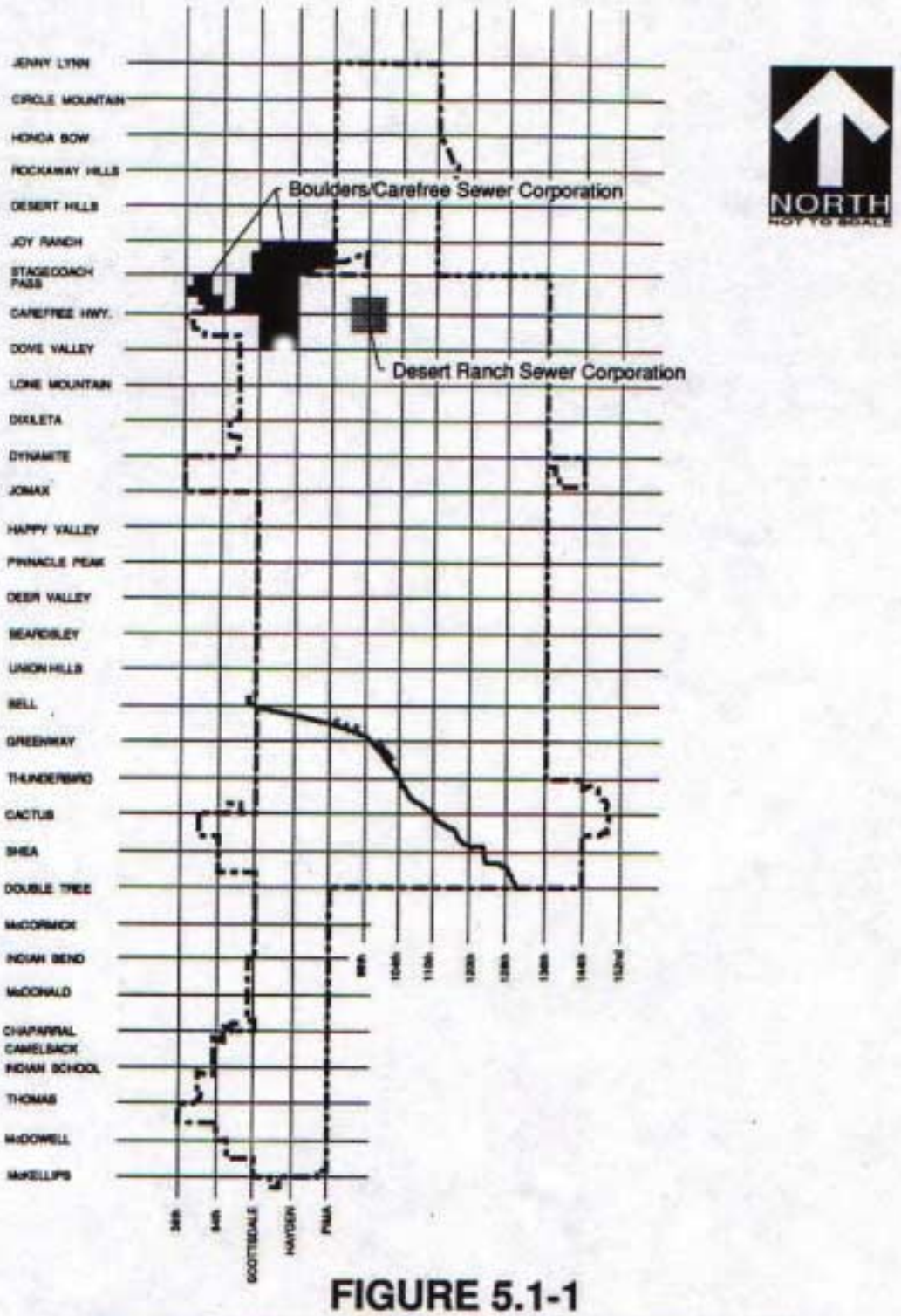
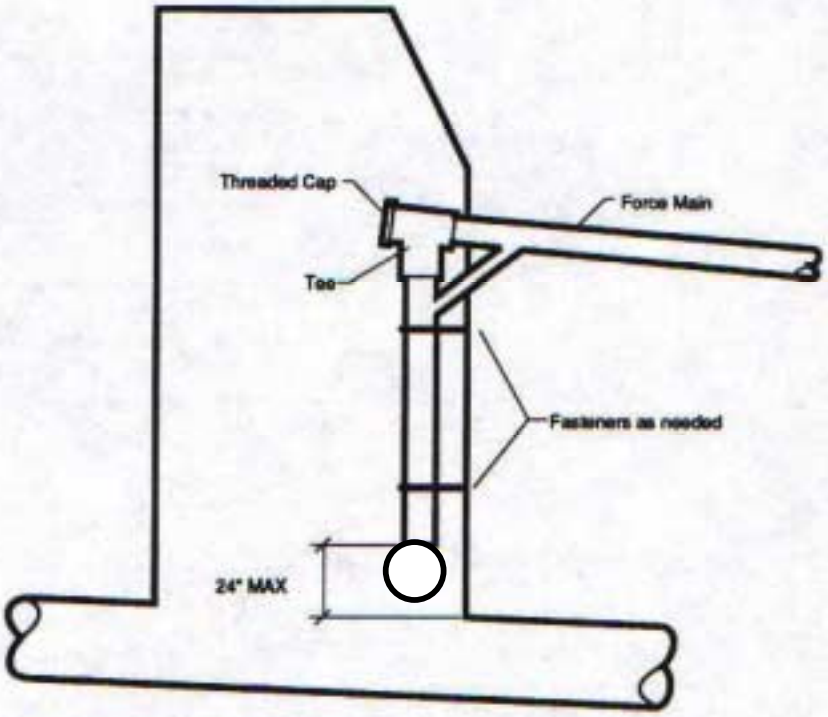


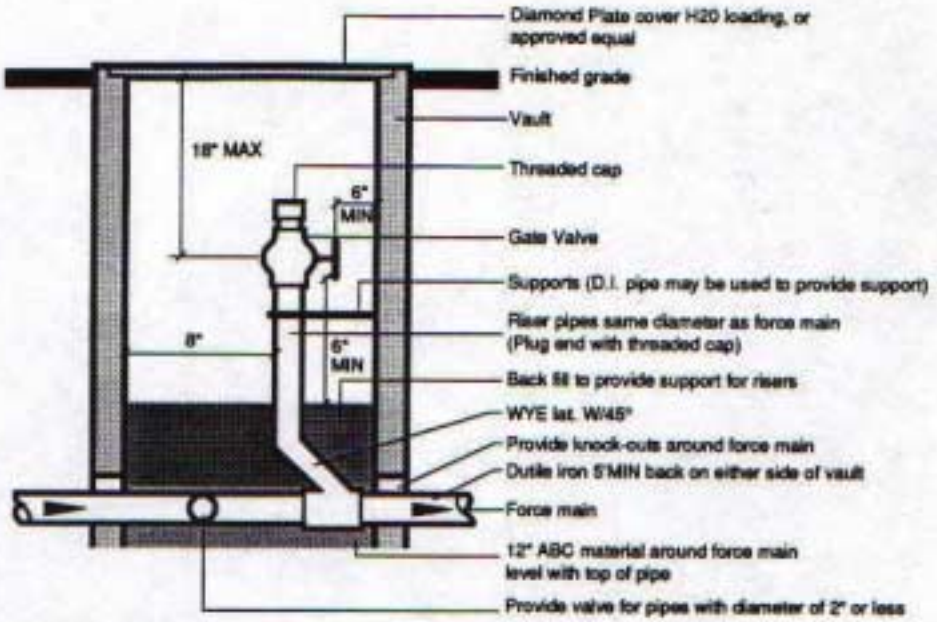

**FIGURE 5.1-1**

Private Sewer Company Franchise Areas - January 1994



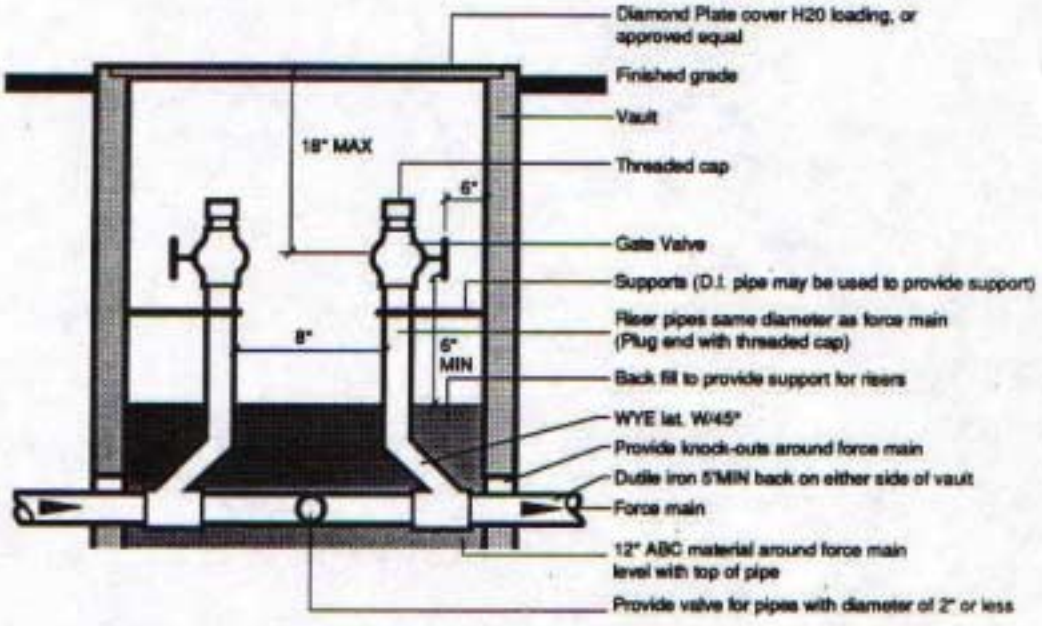

**NOTE:** Discharge outlet shall never be below crown of downstream pipe.

**FIGURE 5.1-2**
Force Main - Manhole Discharge




**One Way Clean-Out**

NOTE: One-Way clean outs shall be installed on maximum 650 foot centers along force main. Rotate vault as required to keep behind back of curb.

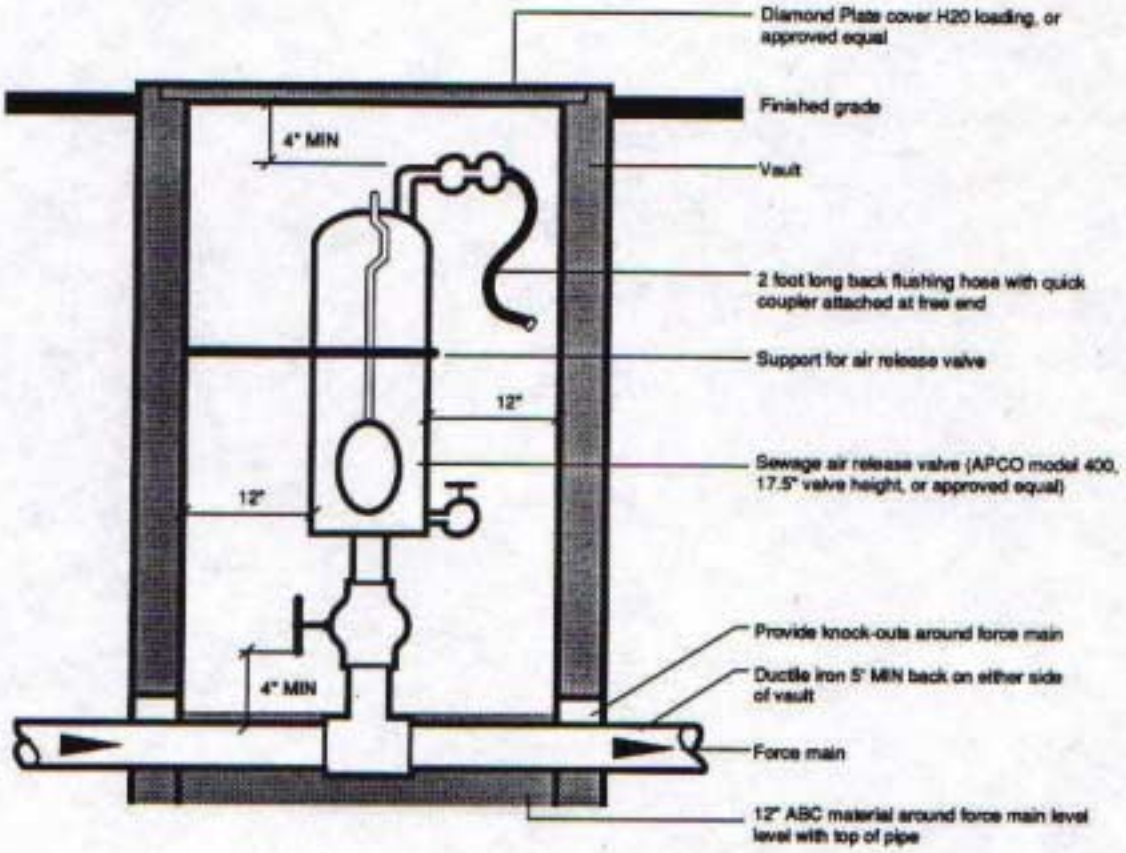



**Two Way Clean-Out**

NOTE: Two-Way clean outs shall be installed on maximum 1300 foot centers along force main. Rotate vault as required to keep behind back of curb.

# FIGURE 5.1-3

Force Main Clean-Outs




NOTE: Rotate vault as required to keep behind back of curb.

**FIGURE 5.1-4**
Sewage Air Release Valve